

18. (New) A coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said coil comprising:

(a) a first ring at one end of said coil, said first ring being electrically conductive and having a first diameter;

(b) a second ring at an other end of said coil, said second ring being electrically conductive and having a second diameter different from said first diameter of said first ring; and

AS (c) a plurality of rods electrically interconnecting said first and said second rings to form said coil therewith, each of said rods having a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring, said tapered portions of said rods collectively providing said coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said coil.

19. (New) The coil claimed in claim 18 wherein said coil is a birdcage coil.

20. (New) The coil claimed in claim 18 wherein said second diameter of said second ring is smaller than said first diameter of said first ring.

21. (New) The coil claimed in claim 18 wherein said tapered portion of each of said rods comprises at least one angled linear segmented section.

22. (New) The coil claimed in claim 18 wherein said tapered portion of each of said rods has a radius that is selected to maximize homogeneity of said magnetic flux density in at least one of an XZ plane and a YZ plane of said imaging planes of said coil.

23. (New) The coil claimed in claim 18 wherein said first ring and said second ring are each larger in diameter than a center of said coil to thereby enable a concentration of said magnetic flux density to be produced at a region centered within said coil.

24. (New) The coil claimed in claim 18 further comprising at least one additional coil at least partially overlapping said coil at an inferior end thereof to form therewith, and for operation as, a phased array.

25. (New) The coil claimed in claim 18 wherein said first and said second rings are circular.

26. (New) The coil claimed in claim 18 wherein said first and said second rings are elliptical with said first diameter being a major diameter of said first ring and said second diameter being a major diameter of said second ring.

27. (New) The coil claimed in claim 18 wherein said coil is a receive-only coil.

28. (New) The coil claimed in claim 18 wherein said coil is a transmit/receive coil.

29. (New) The coil claimed in claim 18 wherein each of said rods and said first and said second rings contain therein a plurality of reactive electrical components.

30. (New) The coil claimed in claim 18 wherein said coil is configured as one of a low pass coil, a high pass coil and a band pass coil.

31. (New) The coil claimed in claim 18 wherein said coil is operable in one of a linear mode and a quadrature mode.

32. (New) A coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said coil comprising:

(a) a first ring at one end of said coil, said first ring being electrically conductive and having a first diameter;

(b) a second ring at an other end of said coil, said second ring being electrically conductive and having a second diameter; and

(c) a plurality of rods electrically interconnecting said first and said second rings to form said coil therewith, each of said rods at each end thereof having a tapered portion, said tapered portions being selected to maximize homogeneity of magnetic flux density in said coil.

33. (New) The coil claimed in claim 32 wherein said first and said second diameters of said first and said second rings, respectively, are equal.

34. (New) The coil claimed in claim 32 wherein said first and said second diameters are each larger than a diameter at a center of said coil such that said tapered portions of said rods are tapered outwardly.

35. (New) The coil claimed in claim 32 wherein said first and said second diameters are each smaller than a diameter at a center of said coil such that said tapered portions of said rods are tapered inwardly.

36. (New) The coil claimed in claim 32 wherein said coil is a birdcage coil.

37. A method of designing a coil capable of exhibiting a substantially homogeneous pattern of magnetic flux density while at least one of avoiding substantial degradation of, maintaining and improving signal-to-noise ratio performance, said method comprising the steps of:

- (a) providing a model of a conventional resonator, said conventional resonator having a first end ring and a second end ring interconnected by a plurality of rods;
- (b) ascertaining said magnetic flux density within said resonator; and
- (c) adjusting a geometry of at least one of said first end ring, said second end ring and said rods, to improve the homogeneity of said magnetic flux density and thereby form said coil.

38. (New) The method as claimed in claim 37 wherein said coil is a birdcage coil.

39. (New) The method as claimed in claim 37 wherein the step of providing a model of a conventional resonator comprises using a wire model thereof.

40. (New) The method as claimed in claim 37 wherein the step of ascertaining said magnetic flux density involves at least one of Biot-Savart modeling and experimental verification.

41. (New) The method as claimed in claim 37 wherein the step of adjusting involves changing at least one of (i) a diameter of said first end ring, (ii) a diameter of said second end ring and (iii) a radius of a taper of said rods by which said rods are connected to said end rings.

42. (New) The method as claimed in claim 37 wherein the step of adjusting optionally applies to a length of said rods when said signal-to-noise ratio performance of said coil is less important.

43. (New) The method as claimed in claim 37 wherein the step of adjusting is performed iteratively.

44. (New) The method as claimed in claim 37 further comprising the step of adjusting a volume of said coil to improve said signal-to-noise ratio performance thereof.

45. (New) A birdcage coil for use with a magnetic resonance imaging (MRI) system to form images of a region of interest during an MRI scanning procedure, said birdcage coil comprising:

(a) a first ring at an inferior end of said birdcage coil, said first ring being electrically conductive and having a first diameter through which said region of interest is provided access to said birdcage coil;

(b) a second ring at a superior end of said birdcage coil, said second ring being electrically conductive and having a second diameter smaller than said first diameter of said first ring; and

(c) a plurality of rods electrically interconnecting said first and said second rings to form said birdcage coil therewith, each of said rods having a linear portion and a tapered portion with said linear portion being connected to said first ring and said tapered portion being connected to said second ring, said tapered portions of said rods collectively providing said birdcage coil with a substantially homogeneous pattern of magnetic flux density in at least one of three orthogonal imaging planes of said birdcage coil while at least one of maintaining and improving a signal-to-noise ratio of said birdcage coil.

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